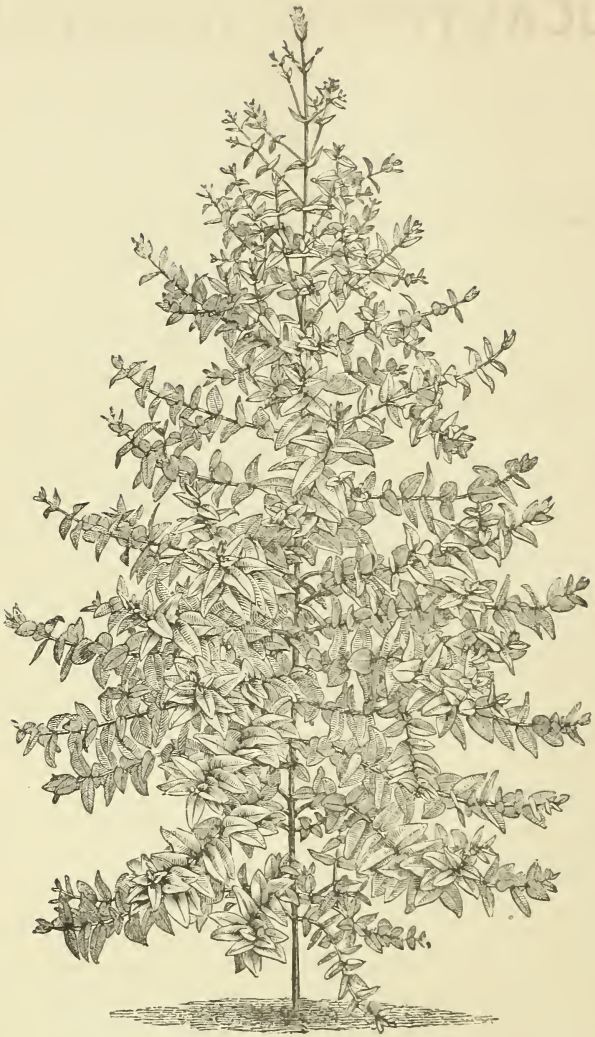

Eucalyptus Globulus.

THE

EUCALYPTUS GLOBULUS,

FROM

A BOTANIC, ECONOMIC, AND MEDICAL POINT OF VIEW,

EMBRACING

ITS INTRODUCTION, CULTURE, AND USES.

TRANSLATED FROM THE FRENCH OF

J.-E. PLANCHON,

Professor of the Faculty of Montpellier, France,

WITH

AN INTRODUCTION.

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EUCALYPTUS GLOBULUS.

The *Eucalyptus Globulus*, or *Blue Gum* tree of Tasmania, has of late years attained a world-wide repute on account of its various valuable properties. It is a member of the myrtaceous family of plants, many of which are famed for their uses in the arts and sciences. The genus *Eucalyptus* numbers over one hundred species—most of them reaching the altitude of trees, and some growing to a height only equaled by the gigantic *Sequoia* of California—and furnishes timber of great value for ship-builders, implement-manufacturers, and engineers. They are popularly known as gum-trees, on account of the quantity of gum which exudes from their stems, and which also forms an article of commerce. The distinguishing colors of the bark and leaves of the different species have originated the names of red gum, white gum, blue gum, &c., to these trees. The blue gum derives its name, therefore, from the bluish-gray bloom of the foliage, especially on young plants, and also from the color of the bark on older trees.

From experiments conducted in German hospitals, ten or twelve years ago, it was made apparent that the leaves of the blue gum possessed anti-periodic properties. Acting upon this information, and in consideration of the great number of cases in this country where anti-periodic medicines are indicated, the Department of Agriculture, in 1866, procured a small quantity of the seeds of the *Eucalyptus Globulus* from an Australian correspondent. These seeds in due time produced plants which made rapid growth in the green-house, and, when they attained sufficient age and size for the purpose, were chemically tested for cinchona alkaloids, which they were supposed to contain. These investigations failed to detect any indications of the alkaloids in question, and more recent experiments afford additional proof that no part of the plant contains them. Nevertheless, the febrifugal nature of the leaves appears to be well established, and preparations from them now constitute a popular remedy in Australia and in other countries against fevers; and several preparations, from various parts of the plant, are being successfully used in intermittent fevers. The leaves, by distillation, yield an essential oil, which has

been found to possess the valuable medicinal properties of cajeput oil. It is known in commerce as eucalypti oil; other species, however, furnish oils which are sold under this name. The blue gum yields an astringent substance which is applicable like catechu and kino in medicine. The leaves have a strong camphorated scent, and have been used with much success in the cure of gunshot and other wounds. Their balsamic nature not only cures, but, after a few hours' application, all unpleasant odor is entirely removed.

More recently, another pre-eminent property has been attributed to this *Eucalyptus;* that is, its power of rendering malarious districts habitable.

The tree is of remarkably rapid growth, and, when planted in marshy places in a suitable climate, it draws the moisture from the soil and dries the earth, owing to the great evaporating-surface of the foliage, thus preventing the generation of marsh-miasm. So far, this would be, at least to a certain extent, a mere mechanical process, and one that might result from the employment of any rapid-growing heavy-foliaged tree, such as some of our large-leaved fast-growing native poplars; but it is extremely probable that the highly-camphorated foliage of the blue-gum trees exerts a chemical influence upon the atmosphere in their immediate vicinity of greater value than that resulting from ordinary leaf-evaporation. Certainly, some such influence is indicated from the extraordinary sanitary effects attributed to this plant, which seem to be worthily authenticated, and have been so efficacious as to warrant naming it the "fever-tree."

Although the Blue Gum is one of the largest trees in the world, its seeds are very small, and care is required in raising young plants. The most satisfactory method is to sow the seeds in light sandy soil, covering them with a slight sprinkling of sand, and pressing the surface by beating it with a spade or flat trowel; this will put the seed sufficiently deep. A frame such as is used for forwarding tender vegetable plants, and which can be covered with a glazed sash, will be found most economical. The soil should be kept moderately damp and the glass shaded for a week or two, until the young plants appear. They make rapid progress under ordinary management.

When the young plants attain a height of three to four inches, it will be necessary to thin them out, so that those remaining will be at least two inches apart, and those that are removed in this operation may be transplanted, like young cabbage or tobacco plants, in a frame similar to that in which they were raised, and set about the same distance apart. If watered, and shaded from bright sun for a week, they will at once commence to grow. After having grown

one year in this position, they will be quite large enough for removal and planting in their permanent sites.

The Blue Gum is, comparatively, a tender plant, especially when young. It is an evergreen of rapid succulent growth, and the young shoots are injured by a few degrees of frost. Many Australasian plants that are subjected to quite severe freezings in their native habitats without suffering injury will not bear even a slight frost in this country. This arises from the circumstance that, in their native country, they are subjected to a degree of aridity, both in atmosphere and soil, toward the termination of their yearly growths, that ripens and solidifies the shoots to a degree altogether impossible in climates of greater humidity, where the still succulent watery shoots are at once destroyed by even a slight degree of frost.

Like some other trees of the Australian forests, the leaves of the Blue Gum diminish in size as the tree advances in growth. On young trees, they are broad and long, and are fixed in a horizontal position. As growth advances, the leaves become narrow, and assume a vertical position, offering their edges instead of their surfaces to the sun, so that there is but little shade or shelter in an Australian forest. It will be a matter of interest to observe how far these trees may adhere to these changes in more humid, or at least in more equable, climates, or whether they will not endure a greater degree of cold when this condition of foliation is attained.

So far as experience in the growth of this tree in this country will warrant an expression of opinion, it will be of no value as a tree in any section or locality where the thermometer at any time indicates ten degrees of frost. Young plants are invariably killed when the thermometer reaches down to 24°. In climates where this degree of cold obtains only at rare intervals, the tree may survive after it has attained an uninterrupted growth for several years, even should the younger shoots and branches be destroyed; as is the case with several plants, such as the orange, and many others, that push out with apparently fresh vigor after the extremities of the branches are killed, which may be likened to a severe pruning. Deep loamy soils will be more favorable to its hardihood than swampy marshes; and dry sandy locations will retard a succulent growth, which will further enable the plant to endure cold.

The Blue Gum is successfully cultivated in California, and, with other species of *Eucalyptus*, is being planted quite extensively. It is reported that Gen. J. T. Stratton, of Oakland, has set out 130,000 of these trees, and that many of them reach a height of forty feet, with trunks one foot in diameter, in four years. Companies have been

formed for the purpose of purchasing land to plant with this and other species; for there are many others of perhaps more value as timber-trees than the Blue Gum.

Large plantations of the iron-bark (probably *Eucalyptus resinifolia*) are reported on the banks of the Sacramento River. This species is said to resist frosts better than the Blue Gum, that being one of the most tender of the whole *Eucalypti* family. Experiments on a limited scale have been made in some parts of Texas with but partial success, and it is reported that trees of the Blue Gum have been destroyed by cold at New Orleans, after reaching a height of fifteen feet.

In Florida, the Blue Gum has grown five feet in height in four months, from seed, and it is reasonable to suppose that it will prove hardy in a large portion of that State.

As remarked above, the Blue Gum is not the only species of *Eucalyptus* worthy of attention. Mr. Casey, of Melbourne, recommends the *Eucalyptus rostrata*, or Red Gum, as being more hardy, and possessing all the sanitary properties of the Blue Gum. The timber of this species is also of great value, capable of a high polish, and specially adapted for piles and for ship-timber. The peppermint-tree, (*Eucalyptus amygdalina*;) the stringy bark, (*E. gigantea*;) the Jarrah, (*E. marginata*,) and many others, are worthy of trial. Their timbers are close-grained and of great strength and durability.

The vast size which they attain may be inferred from the fact that a plank was prepared from the Blue Gum that measured one hundred and twenty feet in length, with a uniform breadth of twenty inches, and two in thickness; thousands of piles eighty feet in length and sixteen inches diameter have been furnished for engineering works. Whether these trees will find a climate to reach such dimensions here remains to be demonstrated.

The following treatise, embracing a succinct history of the origin of the *Eucalyptus*, its introduction and naturalization in Europe and Africa, and a sketch of its botanic character, its economic value, and its medical properties, is from the pen of a distinguished French scientist, M. J.-E. Planchon, and has been translated and published in this form for circulation, as a convenient method of responding to the numerous calls made upon the Department for information concerning this remarkable tree.

DEPARTMENT OF AGRICULTURE,
Washington, May, 1875.

THE EUCALYPTUS GLOBULUS, FROM A BOTANIC, ECONOMIC, AND MEDICAL POINT OF VIEW.

In the gardens which are among the attractions of Paris—at Monceaux, at the Luxembourg, and in the squares—the pedestrian may have remarked a shrub, singular in form and color. It appears to be covered with a white powder, or rather with a waxy gloss of a sea-green tint with bluish reflections. All along the straight and tough stalk are flexible branches, which grow horizontally, and which are garnished with oval leaves, opposed to each other and sessile, that is to say, they rest directly upon the branch, without a stem. This is the *Eucalyptus Globulus*, which, reduced to the proportions of fifteen or eighteen feet, is, so to speak, only a plaything among horticultural novelties. It is taken from the greenhouse, and should be returned to it during the first cold weather; but it is often pitilessly sacrificed. Planted in the spring, raised in open air during summer, placed in the greenhouse the following winter, restored to the lawn after the return of warm weather, profiting with astonishing rapidity by a Parisian summer, at the close of autumn it passes through the cycle of its infantile period. Thus an inclement climate and the caprice of man confine to the term of two years, and to the proportions of a shrub, the venerable destiny and the colossal dimensions of one of the vegetable giants of the globe.

In its native Australia, the *Eucalyptus* reaches its giant growth; but in a climate suited to the production of oranges, even in Europe, it proves to be endowed with an unparalleled rapidity of growth. Wherever winter is only a compromise between a prolonged autumn and an anticipated spring, the plants of Australia, faithful to their native habits, thrive best during the period from October to March. The *Eucalypti* particularly, when taken from the winter-stations of Provence and Nice to Algeria and Corsica, develop there with marvelous vigor, introducing a picturesque element into the landscapes of the region, and promising a valuable source of rich forestry. They already contribute to the salubrity of marshes, perfume the air with balsamic odors which are beneficial to health, are even direct agents against intermittent fevers, and, in fact, constitute perhaps the most useful importation of our time as exotic trees susceptible of the highest culture.

These advantages have attracted the public attention, and in our turn we shall speak of them from a utilitarian point of view, and endeavor to bring into relief the scientific side of the question, which, in its different aspects, is invested with exceptional interest.

I.

ITS BOTANIC CHARACTER.—ITS DISCOVERY IN TASMANIA.

The vast genus *Eucalyptus*, of which there are more than one hundred and fifty species, is one of the types which bear the stamp of their native Australia, the most original country in the world for its natural productions. The country where the swans are black, and where the mammals, such as the *Ornithorhyncus* and the *Echidna*, are confined to oviparous vertebræ, is also the region of which the Abbé Correa de Serra said pleasantly, "Flora holds here a masked ball." Under bor-

rowed features, the plants of that region seem to wear a mask which hides the proofs of their real parentage. Here are *Dryandrias*, which present the appearance of ferns; legions of *Acacias*, which, far from displaying the elegantly-cut leaves of the *Mimosa*, borrow the forms of the juniper and willow. The *Eucalyptus* does not escape this mimicking tendency; and the same variety changes its form with its age, offering the not infrequent phenomenon of *heteromorphism*.

In its youth, as we have seen, the *Eucalyptus Globulus* has opposed, sessile, and glaucous leaves, like a myrtle, or rather like a shrubby, perforated St. John's-wort. But when the shrub becomes a tree, its whole aspect changes. New branches shoot forth, no longer opposed to each other, but alternate. The new leaves, also alternate, are no longer oval, but are elongated and bent like a scythe, and are of a pale-green instead of a glaucous color. They are not sessile, but are balanced to the play of the wind on slender stalks. The myrtle aspect has been transformed to that of a willow, a frequent tendency among the trees of the entire Australian region, which gives a tinge of uniformity to vegetable forms of the most diverse families. Slender, clear, pale, and weeping foliation; the branches dry and tough in texture; abundantly sifting the light; melancholy in the main, where brilliancy of flower is wanting;—such are the well-known characteristics of the arborescent vegetation of which the *Acacia* and *Eucalyptus* are the principal forms.

The *Eucalyptus Globulus* presents itself under two very striking aspects: the infantile form, in which the leaves are opposed and sessile, that is, a sort of *larva* state, during which the plant is not apt to flower; and the adult state, in which the leaves are alternate and petiolate, and which is the perfect state, characterized by the presence of fruit and flowers.

It is not necessary to resort to analogies, and to compare this dimorphism of the *Eucalyptus* to those metamorphoses that insects undergo; such, for example, as the changes of the same insect through the forms of caterpillar, chrysalis, and butterfly. In the latter case, it is the individual itself that throws off its successive envelopes, and appears with new forms, resulting from internal effort and changes of the same organs. In the case of the *Eucalyptus*, it undergoes no metamorphosis, but only appears with new organs superadded to the old ones; or, more properly speaking, the tree represents, not an individual, but a foliate collection, (the *phytons* of Gaudichaud,)* each successive element having its own form independent of the form of the elements which precede and follow it. The resemblances or the differences of these elements do not alter its own individuality. In short, it is a successive *polymorphism*, and not a metamorphosis in the primitive sense of the word.

This *polymorphism* is not, however, a general character of the *Eucalyptus*. It is in a certain measure wanting in the species *Eucalyptus Cordata*, which flowers upon branches with opposed leaves. Here the adult and infantile states are confounded; and, without attempting to establish a too narrow assimilation between animals with centralized functions and plants with multiplied elements, it is, perhaps, allowable to compare the infantile and adult forms of the dimorphous *Eucalyptus* to the two states of tadpole and adult of common batrachians, (toads, salaman-

* By *phyton* is meant the vegetable element, the inferior part of which sinks into the axis with the *hypophylles* of other *phytons*, terminating in the leaf, properly called, and which most botanists term the *appendice*, or *phylle*. It is uncertain what this *phyton* may be, whether cotyledon, leaf, bract, petal, or stamen, as it follows the regions of the axis of the plant in which it is found. This manner of representing the complex and multiplied stock, commonly called the stalk of the plant, does not imply on my part any adhesion to the theory of Gaudichaud, or to his idea that the ligneous fibers descend the leaves in order to constitute the new wood.

ders;) whilst the *Eucalyptus* fructifies upon its branches an infantile type which may be analogous to batrachians called *Perennibranches*, which reproduce themselves while preserving the character of larvæ to the branchial respiration. Whatever may be the character of this general assimilation, the prominent fact is the existence of two states of foliation among certain of the *Eucalypti*, and only one state among others. Now, from causes the action of which cannot be foreseen, a *Eucalyptus* of this first group fructifies upon its young branches, and the seeds of these fruits may not, in germinating, reproduce the characters of the branches from which they are derived; will not nature have thus formed by a simple variation of fixed foliage nearly the equivalent of that which is always described as the species? In other words, if we find the habitually sterile branches of a *Eucalyptus Globulus* normally fructifying, have we not before us a new form of the type, which, encountered by itself and disconnected with its point of departure, would naturally be described as the veritable species? And what assurance have we that the accepted, good species are not thus derived from actually living or from anterior types? This is only an hypothesis; but the natural polymorphism that we observe in the similar elements of the same plant may well represent, when fixed upon that plant, the variations which, in other circumstances, would become detached and isolated, and live separately, protected by the generation of a certain fixity.

We do not pretend to resolve this complex problem of the species in this manner; but we find here an argument in favor of the general theory of derivation, opposed to the theory of the absolute fixity of the types of successive creations by a sort of repeated miracle. Let us, however, leave these nebulous regions of philosophic speculation, and descend to the facts concerning the *Eucalyptus Globulus*.

The discovery of this tree recalls to mind one of the grandest scientific voyages, of which the old French navy has left us a glorious tradition. In 1791, the French National Assembly resolved to seek for the unfortunate, and then long missing, navigator La Pérouse, and confided this trust to the Chevalier d'Entrecasteaux, a well-educated mariner, who was a worthy pupil of the bailiff of Suffren. The two ships of this expedition, La Recherche and L'Espérance, had on board a number of *savants*, among whom were the botanists Labillardière and Riche. The latter died from the fatigues of the voyage and from disappointment at the loss of his collections. The former, who was already known as a traveler in Syria, brought from Australia, and especially from Van Diemen's Land, the valuable materials which he made the basis of important publications. It is in his journal that we find the details of the discovery of the *Eucalyptus*, and the proof that he knew how to present, with rare sagacity, his belief that the wood of this tree would one day become eminently useful in naval construction. We shall here quote from the journal of the naturalist:

"12*th May*, 1792.—[The expedition was then in the port of Entrecasteaux, in the bay of Tempests, Van Diemen's Land.]—I have not yet been able to procure the flowers of a new species of *Eucalyptus*, remarkable for its fruit, which resembles a coat-button.* This tree, which is one of the tallest in nature, since it measures upward of one hundred and sixty feet, only blooms toward its upper extremity. The wood is suited to naval construction, and is durable, but neither

* From this resemblance to a button, Labillardière has taken the name of *Globulus*. This singular fruit suggests the idea of an urn rather than a button. The form is that of a reversed cone, raising four prominent sides, slightly widened at the edge, and hollowed in the center by four cells, which open by large radiating shoulders, separated by as many triangular tongues. Before flowering, this inferior

so light nor so elastic as pine. Perhaps it would be advantageous, in making masts of it, to make them of many pieces, and to hollow the great trunks throughout their lengths, in order to give them more lightness, strengthening them by iron bands. It became necessary for us to hew down one of these trees in order to obtain flowers; but it was very much inclined, and fell quickly. The sun was then very brilliant, and the sap was seen in abundance, and, at the moment of its fall, it sprang out copiously from the middle of the lower part of the trunk. This beautiful tree of the myrtle-family is covered with a smooth bark; the branches bend a little as they rise, and are garnished at their extremities with alternate leaves, slightly curved, and about seven inches in length, and nearly two in width. The flowers are solitary, and grow out of the axils of the leaves. The bark, leaves, and fruit are aromatic, and might be employed for economical uses in place of those which the Moluccas have hitherto exclusively furnished us."

Labillardière also states that the wood of the *Eucalyptus Globulus* served to repair their shallop—a modest use, undoubtedly, but one which preluded the extensive applications of it which the Anglo-Australians at this day make in the construction of their ships. For a long time, the *Eucalyptus Globulus* remained a pure curiosity for a few learned botanists. It was not known even in the botanical gardens; for, in 1854, the writer saw one of the species, the *Eucalyptus Glauca*, in the greenhouses of the Museum of Paris. At the same time, there were to be seen beautiful specimens in the orangery of M. Demidof, at San Donato, under the name of *Eucalyptus Falcata;* and the horticulturists Cels and Noisette had cultivated the first in 1822, and the latter variety in 1824. The English, so rich in Australian plants, have not given this tree any special importance as a garden-plant; for the reason, undoubtedly, that under its juvenile and glaucous form it has not distinguished itself from other well-known varieties of the *Eucalyptus*. In Tasmania, however, the colonists appreciate their magnificent *Blue Gum*, as they call the *Globulus*, and employ it for various uses.

That this forest substance, still confined to a small portion of the globe, may become a feature in future colonizations, will be owing to the following chain of circumstances: The foundation, forty years ago, of the colony of Victoria, in Western Australia; the rise and marvelous development of a great city in that formerly desert region, where the gold-fever paved the way for the surer and more moral wealth of the cultivation of lands; the creation of a beautiful colonial garden in the city improvised by Melbourne; and, finally, the deeds of two men whose memory should be bound to the name of *Eucalyptus*, wherever this tree thrives as a source of public wealth and salubrity, Ferdinand Mueller and Ramel. In the history of the future naturalization of the *Eucalyptus*, Mueller is the *savant* who justly calculated the future of the tree, traced it in its itineracy, and predicted its destiny. Ramel is the enthusiastic amateur who has thrown body and mind into the mission of propagating it. Both have faith, but one is a prophet, the other an apostle, and, in the noble confraternity of services, public gratitude will not separate the names that are bound together by friendship. They will be spoken of as Mueller-Ramel, as the soldiers of the army of Egypt speak of Monge-Berthollet, those co-patriots and *savants* to whom all the scientific fruit of the French expedition to Egypt is due.

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part of the calyx, which becomes the fruit, bears a thick, wrinkled, conoidic cap, which some botanists believe to be the superior part of the calyx; others, a corolla with consolidated petals. It is from this covering that the plant receives the name of *Eucalyptus*, from two Greek words signifying "I conceal well"—the cap for a long time concealing the stamens.

II.

ITS COLONIZATION AND NATURALIZATION IN EUROPE AND AFRICA.

The history of the colonization of the *Eucalyptus* opens with the names of Mueller and Ramel. We shall sketch its most salient points. One of the first things that the English do in the settlement of a country is to found a colonial garden. That which the French have done at Bourbon, Pondicherry, Guadaloupe, Cayenne, and Algeria, the English have accomplished in a splendid manner at Calcutta, the Cape of Good Hope, Sidney, and Ceylon, and, upon a varied scale, at the smaller stations where commerce and politics have planted a settlement. Such gardens become, from their foundation, a field for useful experiments upon native vegetation and upon that obtained from mutual exchange for the purpose of naturalization. Thus, in 1832, Sidney received and cultivated the whole collection of the vines of Luxembourg and of the garden of plants in Montpellier; and thus the British stations of Darjeeling in Himalaya, Ootakamund in the Neilgherries, Akgalle in Ceylon, and the great gardens of Calcutta, Madras, and Peradenia, have become the centers of the culture of *Cinchona*, that valuable tree which the Spanish-Americans have destroyed by improper cultivation, and the English and Dutch have successfully propagated in the mountainous sections of continental India and Java, thus giving it a climate as mild and sure as that of its native country, the Andes.

Without dwelling further upon the general utility of these colonial gardens, where botany is the intelligent auxiliary and often the forgotten initiator of every branch of culture, it may be said that the Botanical Garden of Melbourne presents a striking example of this sort of utility. Here, where for twenty years all the vegetation of the temperate regions of the globe has been experimented upon, is concentered the principal effort for the study of the entire Australian flora. From thence are sent to all the botanical gardens of the world, and to all the gardens of acclimatization, incalculable masses of seeds and living plants, some for purely scientific purposes, others for the decoration of gardens, and others still the economic importance of which is destined to increase as experiment determines the conditions of existence in the new regions where they are transplanted.

We must here, by way of parenthesis, treat succinctly the question of the naturalization of plants. Acclimatization seems to be a consecrated word to designate the change of country which the will of man imposes upon non-migrating vegetation. This word, as generally defined by dictionaries, and by its etymology, implies a profound disregard of the proper nature and temperament of plants, if we may be allowed such an expression. Although the power of resistance among certain animals may be very great, the domestic species do not individually acclimate themselves, but are assisted by the care of man, who, in a certain measure, combats the influences of a climate opposed to their nature. Selection alone, either spontaneous or artificial, can effect, among individuals of different temperaments, such a sorting only as that the most adaptable will resist, while others will succumb. The law of inheritance happily intervenes, which, giving to the progeny of the survivors at least a portion of the advantages of resistance, can preserve the slowly-accumulated modifications of the native temperament of the species. These gradual modifications, often confined within narrow limits, may, in their final result, be better explained by the word *naturalization* than by that of *acclimatization*. In naturalization, the species changes, to adapt itself to its new surroundings. Individuals generally can become accustomed to a climate by habit, and by avoiding

sudden transitions, by clothing, shelter, and artificial temperatures; but this the plant, fixed in the soil and passively exposed to changes, evidently cannot do. Admitting, then, that man has the power of acclimatizing himself, and that some animals adapt themselves in a certain measure to conditions of new climates, vegetation should also become naturalized, if desired. But this adaptation, supposing it real, is in all cases effected slowly, progressively, by gradual selection of individuals of successive generations, and by the creation of those races or local varieties that experience has discovered to be most apt to comply with the special conditions of climate.

An illusion which is now explained has caused gardeners to believe that tropical plants can live in temperate or cold zones, as, after being cultivated in the vase or greenhouse, they suddenly seem able to confront the rigors of the open ground and open air. Such was the case of the dahlia of Mexico; but we forget two circumstances in appreciating the true temperature of this plant. As soon as it grows spontaneously in a zone of relatively temperate altitude, the least frost destroys its exterior parts, as well now as at the time of its first introduction to Europe. "Acclimatization! sweet chimera of the gardener!" says Aubert Du Petit Thomas; and this saying of a botanist of genius remains the irrevocable condemnation of a false and specious theory.

We do not wish to contest with justly-celebrated societies the title of societies of acclimatization, which they have inscribed upon their banners; but we are interested to forewarn the public against the error that this apparently innocent epithet conceals. By favor of the chimera of a pretended adaptation of this kind, the acclimatization of tea, and even of cinchona, in the Algerian colonies, has been seriously proposed to the French government. Ignorance has had her part in these absolutely futile hopes. It has been believed that the question of temperature is a sufficient explanation, while the climatic problem relates less to the absolute or mean temperature than to the distribution of heat following the seasons and the combination of this heat with the hygrometrical state of the atmosphere. In view of this latter fact, we can understand how tea, like the camellia and the azalias of India, does not fear the moderate cold of winter, but rather seeks the humid summers, where, during the heat, it may be moderately saturated with an atmospheric vapor, which defends it against the scorching rays of the sun. These conditions are often better realized in rainy summer climates and under the foggy sky of Western France than in the more southern summer dryness of the coast of the Mediterranean or the mountains of Algeria; and, if it is not extensively cultivated at Brest or Cherbourg, it will be because the summer-heat, and perhaps other conditions necessary to the normal development of this shrub, are wanting there.

There should be some agreement between the two conditions of the problem of the naturalization of plants, namely, the temperament of the subject to be introduced, and the nature of the climate to which the subject must be submitted. To rely upon a modification of climate is neither right in practice nor in theory, at least within a restricted period of time, and outside of some transient fluctuations, or some modifications in the vegetation of the country. To expect of the plant a change of nature is a still more chimerical thing. The true theory and practice is to consult nature, and to study the equivalences or at least the analogies of climate, in general the possibilities of a given naturalization, and, finally, by experiments to establish proofs of the manner in which such vegetation will grow in a new climate, which should preserve for it or refuse it the normal conditions of existence. These complex problems are never resolved *a priori*.

It seems at first sight that if plants of one region are easily naturalized in another, there should be a reciprocity, and that the plants of the second region should be naturalized in the first. Nothing, however, can be more false than this opinion, as botanists well understand. While the wild or cultivated plants of England are introduced in great numbers into Australia, where, for the most part, they become miserable herbs, not a single Australian plant is propagated in England, unless it is for garden-ornament, for which purpose thousands are grown. The English winter is not the only obstacle to this naturalization of Australian plants. It at least spares those which are annuals, and which resow their seeds. The obstacle is caused less by purely climatic circumstances than by the internal conditions, needs, and habits of each plant. Essentially migratory plants can be naturalized in any climate that does not oppose a sort of *veto;* others have an essentially domestic and sedentary character, if we may hazard this metaphor. The first have encroaching habits, oppressive even to autochthonic vegetation; the others, fortified in some nook of a limited region, are a prey to the attacks of man, imported animals, as goats and rabbits, or even to a fatal concurrence of foreign vegetables. It is thus that some fruitful kinds of the malvaceous plants of Saint Helena, peculiar to that isle, threaten to disappear under the triple influence of man, the goats, and the Australian acacia.

M. Alphonse de Candolle has treated the subject of naturalization in a distinguished manner. In the most absolute sense, the naturalized plant should maintain itself in its adopted country, passing through many years of extreme climatic crises, multiplying its seeds, and growing, in short, like an indigenous plant. All plants which by accidental or repeated importations do not thus maintain themselves are simply adventitious; others, which propagate themselves spontaneously, by suckers and not by seeds, as the Japan Gloss, (*Vernis,*) are only demi-naturalized as individuals, not species.

The *Eucalyptus* is cultivated in great numbers in the southern extremity of Europe, and in northern Africa, where it is adapted beforehand to the climate by its nature, but not yet naturalized. The distinction is, however, of little importance when the practical result is the same, and there is no reason why this beautiful tree should not one day propagate itself spontaneously. Meanwhile, as we cannot follow it in its tour of the world, from the Cape of Good Hope to the Argentine Republic, California, and Cuba, let us trace the history of its recent introduction into the regions of Provence, the Maritime Alps, and especially French Africa.

We now return to Ferdinand Mueller and Ramel. Mueller, who is a German by birth and an Anglo-Australian by adoption, is distinguished as a naturalist-voyager by his long and fruitful explorations of Australian flora. As director of the botanical gardens of Melbourne for more than twenty years, he has made this establishment the most extensive, perhaps, of all centers of exchange for plants of temperate and subtropical zones. An indefatigable collector, fruitful author, a skillful *vulgarisateur*, his descriptive works and judicious accounts and enumerations have informed us of all the commercial resources of Australia, whether in indigenous vegetation or in the botanical gardens of the entire world. Wishing to dispense what he receives, he dreams with unceasing ardor of endowing other countries with the natural wealth of Australia. In this generous task, no one can better assist him than M. Ramel. Ramel, who possesses an ardent and unreserved nature, a zeal that grows out of a profound faith in the future of an idea, owes it partly to chance that he became a patron of the *Eucalyptus*. In 1854, while a trader in Australia, he one day visited the botanical garden from curiosity, where,

in a by-path, his attention was attracted to the Blue Gum, which struck him by its elegance and beauty. Almost a stranger to botany, he says he knew neither the form nor name of the tree; but, from the moment he saw it, it became his fixed idea, and formed the tie which binds him so intimately with Mueller, and his constant relations with the Museum of Paris, the Society of Acclimatization, the gardens, *savants*, and amateurs. He believes in the *Eucalyptus* as others believe in the triumph of good. He sees his beloved tree covering the mountains of Algeria, making the marshes salubrious, chasing away fevers, and replacing the stupefying fumigations of hashish by salutary and odorous cigars. The dream of yesterday has almost become the reality of to-day; for, cigarettes aside, no tree has in so short a space of time introduced into the forest-vegetation of Algeria so picturesque an element, or is as useful and as promising for the future.

The *Eucalyptus Globulus* was introduced into Algeria in 1854, while its name and properties were unknown. In 1863, while walking with Mr. Hardy in that part of the botanical garden which rises from the Sahel, (the western portion of the Sahara,) the writer picked up from the ground one of the buds of a tree which he at once recognized and declared to be a bud of the *Eucalyptus Globulus*.* Mr. Hardy denied his positive assertion, a fact of no great importance, but proving that it is well for one to be posted in the true names of plants. This tree probably came from Paris, and perhaps from the same seed-plot as the cultivated stalks in the museum at that time. Mr. Hardy naturally destined his young subjects for general distribution in the colony; but the calculated slowness of the emancipation of this plant discouraged the impatient desires of the amateurs who were waiting for its culture. In 1862, M. M. A. Cordier, a distinguished colonist, obtained directly from M. Ramel one hundred seeds of the coveted tree. He sowed them, and obtained sixty-two plants, which, in May, 1863, were only about five inches in height. In the spring of that year, I sent M. Charles Bourlier twelve stalks of the *Eucalyptus* from Montpellier, which were distributed among careful amateurs, principally to M. Cordier, and attained such rapid development that the desire to possess this beautiful tree increased. From that moment, the *Eucalyptus*, at first by hundreds and then by thousands, took possession of Moorish ground; M. Cordier keeping the advantage in this steeple-chase for the *Eucalyptus* by planting many acres in masses.

Soon after, M. Trottier, another colonist, proved his faith in the new tree by his works. An ardent planter, he regarded this tree as possessing a forest-substance capable one day of enriching the colony, and he took, for the motto of one of his writings, the following ambitious words: "The wood of the *Eucalyptus* will be the great product of Algeria." Carrying his confidence still further, he saw the desert retreating before this colonized tree, and, speculating upon the incontestable fact that the forest created humidity, and changed the hygrometrical *régime* of a country, and remembering besides the subterraneous sheets of water beneath the arid surface of this region, he boldly named another pamphlet, "The Wooded Desert and Colonies." There may be something Utopian in this illusion, and indifferent minds may conclude that the writer's language is so assured and positive as to create suspicion; but enthusiasm has its price where its object is to urge opinion toward a useful end, and, if the pioneers of a new path are doomed to

* M. Clamageran, in his interesting volume entitled "Algeria," says, "The bud of the *Eucalyptus* is composed of an inverted cone, divided by four prominent beards, which are covered by a large conical cap; little wrinkles, sprinkled with a white powder, roughen the surface. One would say it was a fragment of an alpine rock covered with a thin layer of snow."

disappointment, their mistakes will serve to open the way to the prudent and timid. However, if the desert is not to be conquered, the cause of the *Eucalyptus* has gained greatly in other respects. In Algeria, it is most favorably naturalized. It triumphantly borders the railways, of which it has seen the birth and marked the date. The garden-inclosure can no longer retain it; it is planted by hundreds of thousands, in groves, in avenues, in groups, in isolated stalks, in every section of three provinces, and the foreigner who does not know the exotic origin of the *Eucalyptus* would suppose it to be an indigenous tree.

It is singular that the two most characteristic plants of the climate and flora of Algeria were both introduced into the old continent before the discovery of the new. The fig-tree of India and the agave, vulgarly called aloe, are not only foreign to Africa, but they represent two exclusively American families. If historical documents did not attest to the recent importation of these plants, botanists alone would suspect it from the geographical distribution of their respective families, and from the fact that their multiplication does not usually take place from seeds, but from cuttings and suckers. If the *Eucalyptus*, like the agave and opuntia, seems to belong to Algeria, we can only say that the country along the northern coast of the Mediterranean is also adapted to its requirements. In Central France, the only points where the plants of Australia prosper are those where oranges vegetate in open air without artificial shelter. Port Vendres, Collioure in the Western Pyrenees, Saint Mandrier, Hyeres in the Var, Cannes, Antibes, Nice, Villefranche, Monaco in the Maritime Alps—these are the privileged stations where winter is the season in which exotic plants vegetate and bloom. Outside of this favored region the climate is exposed to those rough changes, which do not suit the temperament of the *Eucalyptus*. Even the purity of the climate favors the radiating frosts that, in one night, destroy the hopes of a year, without reckoning the enormous depressions of temperature (even to 17° centigrade at Montpellier) that level to the ground the shrubs and natural trees of the region. The culture in open air of Australian vegetation at Montpellier, Marseilles, and Narbonne, is a frightful experience for the earnest amateur who loves these poor stocks with an anxious sentiment. The writer has felt these fears; for, from 1863 to 1870, he submitted to these deceptions, and from this long and painful experience drew the conclusion that the climate of Languedoc and the western part of Provence is not suited to the culture of the *Eucalyptus Globulus*, which amounts there to nothing practical in the way of purifying and drying up the marshes. Experiments in the latter sense have not been made in Camargne, which is an island of alluvial formation; but it is doubtful if it would succeed in so flat and unsheltered a region, desolated by the northwest winds of the Mediterranean, and offering, in its spontaneous vegetation, no indication of a warmer climate than that of the sea-coast of Montpellier. Even at Marseilles, on the hill of the Roncas Blanc, where the taste of Mr. Talbot has created a protecting shade of alpine pines, and in the cavities of the rocks a shelter for delicate plants, the *Eucalyptus* is a chilly and strange guest, superb and luxurious in its juvenile period, but failing in the adult period.

The introduction of the *Eucalyptus* in Eastern Provence goes back to about the year 1858. In 1860, the garden of the Huber brothers, at Hyeres, possessed a well-characterized plant, which was almost a tree, with a pyramidal summit. At the same time, M. Gustave Thuret, of Antibes, had one specimen-plant in his lawn which had survived two winters. In June, 1860, I sent M. Thuret seeds that produced subjects which, planted in the early spring of 1861, and passing through a year of excessive dryness, were from six to nine feet in height in 1862. When I saw them in November, 1863, I could not believe my eyes; they were veritable

trees, with trunks, ample foliage, and flowers. Now the entire region from Cannes to Monaco displays to travelers the pale foliage and venerable trunks of the olive and the vast forests of Italian pines, the aspiring branches of the *Eucalyptus*, with their scythe-shaped leaves trembling beneath the slightest breeze, and supporting the repeated and violent winds from the east, which are similar to the maestral, and the tyrant of these parts.

We thus see the *Eucalyptus* established and naturalized in Algeria and the winter-residences along the sea-coast of Provence and Nice. What advantages can we expect from this recent importation? Many, and of divers natures—some evident; others subject, perhaps, to a little reserve. In the review that we shall offer of the tested and future uses of this tree, two points of view will be presented: the future of the *Eucalyptus* as a forest-substance, its hygienic *rôle* in restoring the healthiness of marshes, and its curative action in fevers and other maladies, subject to which is the succinct study of its aromatic products, of which the physician, the perfumer, and even the confectioner, has already varied the combinations.

III.

ITS VALUE AS A FOREST-SUBSTANCE.

Many species of the *Eucalyptus* are, in their native country, truly gigantic trees. A *Eucalyptus Colossea* (the *karri* of the natives) has measured nearly four hundred feet in height, and a *Eucalyptus Amygdalina* from four hundred and sixteen to four hundred and seventy-one feet. One of the latter species has reached the height of five hundred feet, which is one hundred and forty-six feet higher than the dome of the Invalides, thirty-three feet higher than the arrow of the cathedral of Strasburg, and twenty feet higher than the pyramid of Cheops, the tallest structure in the world. Thus the *Eucalyptus Amygdalina* will cast a shadow upon the summit of the great pyramid. A giant *Eucalyptus* of Tasmania was not less than thirty feet in diameter near the soil, the height being about three hundred feet. Such a tree would yield about 977,563 pounds of timber.

Without expecting such vast proportions in general, the *Eucalyptus Globulus* is not the less the largest forest-tree in the world. The trunk can supply immense planks, some of which have been sent as specimens to the great international expositions. One, for example, was sent to the London exhibition of 1862, measuring seventy-five feet in length and about ten feet in width, with a proportionate thickness. Australia desired to send a plank one hundred and sixty-five feet long, but abandoned the idea, as no ship could be found to transport it. The English navy begins to appreciate this wood for its solidity, durability, and tenacity. The best whale-ships that furrow the South American seas are those of Hobart Town, the keels of which are made of the *Eucalyptus Globulus*. The wood of the *Eucalyptus* combines density of texture with rapidity of growth. This growth is particularly rapid during its juvenile period, but it does not cease to grow in height until it is twenty-four years old; after this age, the trunks, which are generally very straight, only increase in diameter. Compact and tenacious, the wood of the *Eucalyptus*, owing to the presence of resinous materials, possesses a sort of incorruptibility which allows it to remain a long time in contact with salt-water. It is equally durable in the ground as is the oak, and can be employed with advantage for sleepers for railroads. The durability of the wood makes it valuable for the keels of vessels, for the construction of bridges, piers, and viaducts, and for piling-

wood it yields only to the white-oak of Canada. If it is not useful in carpentry it will be owing to the difficulty of cutting it into small pieces. In 1860, the price of a cubic foot of the *Eucalyptus Globulus* at Melbourne varied from fifty to seventy-five cents, according to the size of the piece.

It is difficult to estimate the real value of the *Eucalyptus* in Australia as a forest-substance—impossible, indeed, in an absolute sense, as it can only be ascertained by presumptive approximations. It is too difficult a problem to be solved from incomplete data. In regard to the too confident hopes of M. Trottier, who predicted for one thousand stalks a gross revenue of $240 in five years, and $10,650 in twenty-six years, we must compare with this the more modest calculations of M. Cordier, who estimates in detail that one thousand trees planted in groups would yield a revenue of $620, which represents, for the culture of one hectare, (2½ acres,) an annual revenue of about $60. If these figures are far from the results dreamed by certain enthusiastic planters, they show nevertheless a profit which should greatly encourage colonists in the planting of the *Eucalyptus*. M. Cordier adds, in the unedited notes that he communicated to M. Ramel in 1871, that the profit from trees planted in a row will be greater than that from trees planted in groups—a very strong reason, we might add, for the experiment of isolated trees; but, in that case, we should leave sylviculture, and become subject to the variable conditions of the culture of fancy.

M. Trottier based his estimate of the annual growth of the *Eucalyptus* upon the fact that trunks of the trees at Hamma grew thirteen centimeters (say four-and-a-half inches) in circumference yearly. As these trees were planted in rows, Trottier thought that those planted in groups would admit of a growth of ten centimeters; but he forgot the fact that in twenty-six years it would be impossible for one thousand trees to reach this growth without injury to each other, and that a clearing-out would be necessary, thus progressively reducing the number. Cordier calculated upon this deficit, whence the difference in the results. Practical culturists can judge of this difference. The question will be answered by experience. The essential thing is that we may be assured beforehand that the wood of the *Eucalyptus* is destined to hold an important place among the productions of Algeria.

It is also important to know in what soils the new tree will grow most advantageously. In respect of salubrity and rapidity of growth, it requires low, marshy, and warm soils; but, as the species in the natural forests thrive in dry and poor soil, Algeria may make it a resource for wooding its mountains and barren plains. Even plants of the temperature of the camel only accommodate themselves to the aridity of the desert upon condition of being well watered. The *Eucalyptus* resists summer dryness, and profits by the rains of autumn, winter, and spring, wherever the mildness of climate permits it to vegetate without interruption.

It is this admirable continuity of vegetation which explains the rapid growth of the *Eucalyptus*. When the roots plunge into a fresh and fertile soil as at Hamma, near Algiers, the growth in height of young trees averages nineteen inches per month. At Cannes, a stalk a year old, which was planted in May, attained the height of nineteen feet by the following December; the year after, it grew nineteen feet; but the latter part of the third year this impulse diminished, although it remained strong, so that in 1857 it was planted by the brothers Huber at Hyères, and in 1872 it was a tree more than seventy feet in height.

It is not only as a forward and fruitful producer of useful wood that the *Eucalyptus* has attained a celebrity; hygiene, medicine, has found in it resources, of which we shall speak generally.

IV.

ITS MEDICINAL PROPERTIES, AND SALUTARY ACTION UPON MALARIOUS DISTRICTS.

In Valencia, Spain, the *Eucalyptus* is vulgarly called the fever-tree on account of its properties for preventing malarial fevers; but there are two ways of combating these habitually endemic affections: they can be prevented by salubrity of climate, which is the hygienic treatment, or they can be conquered individually and directly by the application of therapeutic febrifuges. Let us examine these two aspects of the *rôle* of the *Eucalyptus*.

It is well known that the country in which this beautiful tree grows naturally is, in general, very salubrious, and this fact is attributed to the influence of climate. M. Ramel, yielding, perhaps unconsciously, to a partiality for the tree, attributes this sanitary advantage to the *Eucalyptus*. Hence, his first idea of the hygienic action of the tree, an idea that was at first confused and unreasonable, but which took shape in his mind, as the plantations of Blue Gum in the marshy lands of various parts of the world strengthened his presumption by the testimony of proof. We would cite the Cape of Good Hope, where the Australian tree, transported by the colonists of Victoria and New Zealand, in two or three years rendered the unhealthy portions of the country salubrious.

Experiments followed in Spain, where the *Eucalyptus* was introduced in 1860 by the Society of Acclimatization, and flourished in the provinces of Cadiz, Seville, Cordova, Valencia, and Barcelona. Corsica and Algeria, in their marshy portions, furnish still other examples of the fact, which is corroborated by skillful physicians, among whom is Dr. Carlotti.

The incontestably salutary action of groups of *Eucalypti* may be explained by two combined causes: first, by a simple effect of drainage, operated in the soil by the powerful suction of roots and the corresponding exhalation of leaves; secondly, by the balsamic emanations which the air-cells of the tree throw out profusely into the atmosphere. This effluvium, the volatile base of which is an essential oil, acts upon the organism as a general stimulant, and it is well known that *circumfusa* of this kind, such, for example, as the aromatic emanations from pines, are favorable to health, and are curatives for diseases of the lungs, and those feeble conditions which require an exciting tonic medicine. M. Gubler thinks that the volatilized essence of the *Eucalyptus* may have a direct and destructive action upon the unknown germs of malarial miasma, germs which some recent authors claim to be microscopic algæ, and which others place in the badly-defined category of the *organites* of animal nature. However this may be, the hygienic influence of the *Eucalyptus* is established, and it should be planted in every country that is infected with malarial fever.

And this is not all. Without being, properly speaking, an antiperiodic, like the *Cinchona*, the *Eucalyptus* seems, from the most authentic testimony, to be a very efficacious remedy against a great number of intermittent fevers. In 1863, Ramel, who is ignorant of the art of medicine, predicted this action of the tree to which he had boldly attributed the salubrity of Southern Australia. Being at Valencia on a visit to his *Eucalyptus*, he said to Mr. Edward Wilson, pointing to the pestilential rice-plantations, "This is the nest of the fever which desolates the country, and it is the *Eucalyptus* which must render it salubrious." Two years later, M. Robillard, a well-known gardener of Spain, visited the museum, where the late Newman, its superintendent of horticulture, showed him the *Eucalyptus Globulus* as a novelty. "Do you call that a novelty?" exclaimed Robillard; "It may be

one for you Parisians, but not for the countrymen of Valencia; there its properties are so well known as a cure for fevers that its leaves are often plundered, and, in a public garden of a great city, it is necessary to surround the fever-tree with a guard, in order to prevent it from being stripped."

It is also in Spain that the first positive experiments upon the anti-febrile virtues of the *Eucalyptus* were made by Dr. Tristany. His observations were published in the *Compilador Medico*, a publication of small circulation, and they confirmed the already popular reputation of the new remedy in the Mediterranean provinces of Spain. They also incited a French physician of Montevideo, the late Dr. Adolphe Brunel, of Toulon, to make the *Eucalyptus* the subject of grave clinical experiments. He died suddenly at Paris in October, 1871, leaving the results of his study unpublished; but his family piously performed the duty of publishing his work. Meanwhile, the researches of M. Gimbert, of Cannes; Carlotti and Tedeschi, of Corsica; Mares and Miergnes, of Algeria; Gublet and Leuglet, of Paris; Lorinser, of Vienna; Sacchero, of Sicily; Castan, of Montpellier; and many others, placed the anti-febrile properties of the new medicament beyond a doubt.

Besides the anti-febrile properties of the *Eucalyptus*, we should mention that it has disinfectant virtues and is antiseptic for wounds; its essential oil being a stimulant, and the tannin in the leaves acting as a tonic astringent. Applied exteriorly, the leaves hasten the healing of a wound; while a weak infusion of the leaves is a good substitute for tea, as a stimulating and healthful drink. Properly administered, the *Eucalyptus* is useful in certain forms of lung-diseases; and, although the action of cigarettes in the latter case has not been positively established, this form of medication is confidently recommended by M. Ramel. Prosper Mérimée, in his last illness at Cannes, experienced its good effects as a composing draught for a cough and oppression.

The pharmaceutical side of the question must be treated superficially in a sketch in which technical details are excluded. Various chemists have enumerated its uses as an infusion, decoction, powder, distilled water, tincture, extract, and essence; as, also, the immediate principles that chemistry has extracted from the divers organs of the *Eucalyptus*. The best-defined and most curious of these principles is the *eucalyptol*, a volatile product extracted from the essential oil of the *Eucalyptus*, in 1870, by M. Cloez, of the Museum of Paris, who also derived, by the action of an acid, two other bodies called *eucalyptène* and *eucalyptolène;* but these bodies have only a chemcial interest. The raw essential oil, attained with great facility by the distillation of every part of the plant, is a common product the physiological properties of which Dr. Gilbert has studied with great care. In a large dose, it is a poison to animals, which is, at first, stimulating; then, when a proper dose is employed, it is composing, and seems to exercise its action upon the posterior cellules of the spinal marrow, thus causing changes in the respiratory, circulatory, and calorific functions, which, in part, depend upon this nervous region. The presence of an essential oil, analogous by one of its principles, the *eucalyptol*, to the camphors of Java and Borneo, and to the essences of peppermint and cajeput, explains some of the properties of the *Eucalyptus*, (its antiseptic and stimulating action, its effec upon the circulation and the vomition of persons affected with cholera.) The tannin and resin it contains make it a tonic and astringent; but its action as a febrifuge depends upon a special principle, which is supposed to be an alkaloid. M. Carlotti thinks he has isolated this body, extracting it by means of a sulphuric acid of a resinous substance similar to the resin-quinine; but ulterior researches leave this matter in doubt.

The essence of the *Eucalyptus* has already entered the domain of the toilette as an aromatic vinegar of alcoholic perfume. Like all very odorous essential oils, it is very strong, and more or less disagreeable inhaled in mass; but, when diluted, the aroma is more mild, and persists for a long time, with a character of its own, but which resembles camphor, laurel, and peppermint. Ramel has had very agreeable *bonbons* flavored with it, for the cure or relief of coughs and chronic bronchial affections.

The *Eucalyptus Globulus* is not the only tree of this genus which contains an odorous essence. All myrtles have their organs filled with little reservoirs of a volatile oil. The characteristic odors of the *Eucalyptus* give the vulgar name of the tree. Thus, the *Eucalyptus Amygdalina* is called the Tasmanian peppermint; the *Eucalyptus Odorata*, the peppermint.

Resin is a common product of the various kinds of *Eucalyptus*, which are called either red, white, or blue gum trees, as they produce red, white, or blue resin. The names of stringy bark, iron bark, &c., bear allusion to other characteristics which the tree possesses.

But it is time to close this sketch, designedly limited to the Blue Gum of Tasmania. This alone, of all its numerous family, has really succeeded in Europe, Asia, Africa, and America. It furnishes the rare example of a truly Australian tree having become a citizen of the world by the right of utility and beauty. Deprived of indigenous animals and fruit-trees, for a long period only a desert that scarcely supported a few miserable inhabitants, Australia, hardly a century ago, entered the current of general civilization, and adopted our cereals, our fruits, and even our domestic animals. It already sends us, with its gold and wools, the meat of European sheep and beeves, fed upon its extensive pastures, and has filled our greenhouses with singular and brilliantly-flowering plants. Now its entire flora ornaments Algeria and the Mediterranean region; but above the legion of shrubs which form, as it were, its cortege, the *Eucalyptus* elevates itself with a sovereign power. In its juvenile state, it is a finished type of elegance; in its adult period, it is a magnificent representation of strength.